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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/667,006

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Michael E. Mack

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EXAMINER

MCDONALD, RODNEY GLENN

ART UNIT

PAPER NUMBER

1753

SHORTENED STATUTORY PERIOD OF RESPONSE	MAIL DATE	DELIVERY MODE
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3 MONTHS

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PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

Office Action Summary	Application No. 10/667,006	Applicant(s) MACK, MICHAEL E.	
	Examiner Rodney G. McDonald	Art Unit 1753	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-22 is/are pending in the application.
 4a) Of the above claim(s) ____ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 9-14 is/are allowed.
- 6) ☒ Claim(s) 1-8, 15, 16 and 18-22 is/are rejected.
- 7) ☒ Claim(s) 17 is/are objected to.
- 8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on ____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
 Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
 Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
 a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. ____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. ____. |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date <u>2/04.9/03</u> . | 6) <input type="checkbox"/> Other: ____. |

DETAILED ACTION

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 1 and 5 are rejected under 35 U.S.C. 102(b) as being anticipated by Fuzishita et al. (U.S. Pat. 4,916,311).

Regarding claim 1, Fuzishita et al. teach a low energy electron source for neutralizing the space charge of an ion beam. (See Abstract) Fuzishita et al. teach in Fig. 5 one or more filaments 17 for emitting electrons. A filament power supply 18 for biasing the one or more filaments to induce low energy electron emission. An anode electrode 120 for accelerating the electrons away from the one or more filaments 17 and toward a gas cluster ion beam 5 having an axis so as to have a neutralizing effect on the space charge of the gas cluster ion beam 5. An acceleration power supply 121 for biasing the anode electrode 120 with respect to the one or more filaments 17. A deceleration electrode 122 for decelerating the accelerated electrons. Means for biasing 123 for biasing the deceleration electrode with respect to the one or more filaments. (See Fig. 5; Abstract; Column 8 lines 9-27)

Regarding claim 5, as seen in Fig. 5 schematically the biasing means comprises a direct electrical connection of the deceleration electrode to an end of the one or more filaments. (See Fig. 5)

Claims 15 and 19 are rejected under 35 U.S.C. 102(b) as being anticipated by Mack et al. (WO 02/052608 A2).

Regarding claims 15 and 19, Mack et al. teach a vacuum chamber 300. (Fig. 3) A gas cluster ion beam source disposed within the vacuum chamber for forming a gas cluster ion beam, the gas cluster ion beam having a beam axis. (See Fig. 3 for example; Page 7 lines 19-26) A workpiece holder 150 for holding a workpiece. (Page 6 lines 5-8) Mack et al. teach a low energy electron source within the vacuum chamber for neutralizing the space charge of the gas cluster ion beam. (Page 7 lines 30-35; Page 8 lines 1-5) A vented Faraday cup is provided for collecting gas cluster ion beam current for measurement to control the processing of the workpiece. (Page 8 lines 24-29; Abstract)

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 2-4 and 6-8 are rejected under 35 U.S.C. 103(a) as being unpatentable over Fuzishita et al. (U.S. Pat. 4,916,311) in view of Douglas (U.S. Pat. 4,361,762).

Fuzishita et al. is discussed above and all is as applies above. (See Fuzishita et al. discussed above)

The differences between Fuzishita et al. and the present claims is that the deceleration electrode being cylindrical and coaxial with the gas cluster ion beam axis,

and disposed between the anode electrode and the gas cluster ion beam is not discussed (Claim 2), the anode electrode being cylindrical and substantially coaxial with the gas cluster ion beam axis, and is disposed between the one or more filaments and the gas cluster ion beam is not discussed (Claim 2), the deceleration electrode including an aperture for transmitting the gas cluster ion beam is not discussed (Claim 3), a substantially cylindrical electron reflecting electrode is substantially coaxial with the gas cluster ion beam axis; a power supply for biasing the electron reflecting electrode with respect to the one or more filaments; and wherein the one or more filaments are disposed between the electron reflecting electrode and the acceleration electrode and the electron reflecting electrode is biased so as to reflect electrons toward the acceleration electrode is not discussed (Claim 4), the anode and the deceleration electrode having an electron transparency of 90 per cent or more is not discussed (Claim 6), the decelerated electrons having an energy of less than 10 electron volts is not discussed (Claim 7), the one more filaments comprise two or more filaments disposed substantially parallel to the gas cluster ion beam axis and substantially equally spaced about the gas cluster ion beam is not discussed (Claim 8).

Regarding claim 2, Douglas teach that the electrodes should cylindrical and coaxial with the ion beam. (See Fig. 2) In Fuzishita et al. teach that the deceleration electrode 122 is located between the anode electrode 120 and the ion beam. (See Fuzishita et al. Fig. 5) In Fuzishita et al. teach that the anode 120 is disposed between the filament 17 and the ion beam. (See Fuzishita et al. Fig. 5)

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Regarding claim 3, Fuzishita et al. teach that the deceleration electrode includes an aperture for transmitting the gas cluster ion beam. (See Fig. 5)

Regarding claim 4, Fuzishita et al. teach a cylindrical electron reflecting electrode 20 that is coaxial with the gas cluster ion beam axis. (See Fig. 5) A power supply 21 for biasing the electron reflecting electrode 20 with respect to one or more filaments 17. (See Fig. 5) The one or more filaments 17 are disposed between the electron reflecting electrode and the acceleration electrode (i.e. anode). (See Fig. 5) The electron reflecting electrode 20 is biased so as to reflect electrons toward the acceleration electrode. (See Fig. 5)

Regarding claim 6, Fuzishita teach that the anode electrode and the deceleration electrode have a transparency. The holes appear to be 90 percent or more. (See Fig. 5)

Regarding claim 7, since the power sources in Fuzishita are variable the electrons can achieve Applicant's results of 10 electron volts. (See Fig. 5)

Regarding claim 8, Douglas suggest the use of multiple filaments. (See Fig. 2; Column 4 lines 9-11)

The motivation for utilizing the features of Douglas is that it allows for neutralizing the ion beam. (Column 1 lines 10-12)

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have modified Fuzishita et al. by utilizing the features of Douglas because it allows for neutralizing the ion beam.

Claims 16, 18 and 20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Mack et al. (WO 02/052608 A2) in view of Fuzishita et al. (U.S. Pat. 4,916,311).

Mack et al. is discussed above and all is as applies above. (See Mack et al. discussed above)

The differences between Mack et al. and the present claims is that the particulars of the low energy electron source is not discussed (Claims 16, 20) and the ion beam current or the gas flow is not discussed (Claim 18).

Regarding claims 16, 20, Fuzishita et al. is discussed above and teach the particulars of the low energy electron source. (See Fuzishita et al. discussed above)

The motivation for utilizing the features of Fuzishita et al. is that it allows for neutralizing the ion beam. (See Abstract)

Regarding claim 18, Mack et al. teach controlling current and such is believed to adjustable to meet the required current of the claims. (See Abstract)

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have modified Mack et al. by utilizing the features of Fuzishita et al. because it allows for neutralizing the ion beam.

Claims 21 and 22 are rejected under 35 U.S.C. 103(a) as being unpatentable over Mack et al. (WO 02/052608 A2) in view of Fuzishita et al. (U.S. Pat. 4,916,311).

Regarding claim 21, Mack et al. teach generating a plurality of low energy electrons and accelerating the low energy electrons toward a gas cluster ion beam.
(Page 7 lines 30-34; Page 8 lines 1-5)

The difference between Mack et al. and the present claims is that the decelerating of the electrons is not discussed (Claim 21) and the redirecting of the low energy electrons is not discussed (Claim 22).

Regarding claim 21, Fuzishita et al. teach decelerating the electrons with electrodes 122. (See Fuzishita et al. discussed above)

Regarding claim 22, Fuzishita et al. teach redirecting the electrons with electrode 20. (See Fuzishita et al. discussed above)

The motivation for utilizing the features of Fuzishita et al. is that it allows for neutralizing the ion beam. (See Abstract)

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have modified Mack et al. by utilizing the features of Fuzishita et al. because it allows for neutralizing an ion beam.

Allowable Subject Matter

Claims 9-14 are allowed.

Claim 17 is objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

The following is a statement of reasons for the indication of allowable subject matter:

Claims 9-14 are allowable over the prior art of record because the prior art of record does not teach the claimed vented faraday cup including a plurality of substantially coaxial electrically conductive ring electrodes disposed with gaps between

the ring electrodes wherein the plurality of electrically conductive ring electrodes are arranged and electrically connected in at least three groups of at least two ring electrodes, each group independently electrically biased so as to minimize undesired charged particle leakage into or out of the cup.

Claim 17 is indicated as being allowable over the prior art of record because the prior art of record does not teach the claimed subject matter including the vented enclosure surrounding and extending in front of the strike plate and comprising a multiplicity of electrically conductive ring electrodes disposed with gaps between the ring electrodes wherein the multiplicity of electrically conductive ring electrodes are arranged and electrically connected in at least three groups that are independently electrically biased for minimizing undesired charged particle leakage into or out of the faraday cup and each of the at least three groups of electrically connected ring electrodes comprises two or more ring electrodes.

The closest prior art of record to Mack et al. (WO 02/052608 A2) fail to teach the claimed electrode structure required by the Faraday cup.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Rodney G. McDonald whose telephone number is 571-272-1340. The examiner can normally be reached on M- Th with Every other Friday off.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nam X. Nguyen can be reached on 571-272-1342. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.



Rodney G. McDonald
Primary Examiner
Art Unit 1753

RM
January 5, 2006